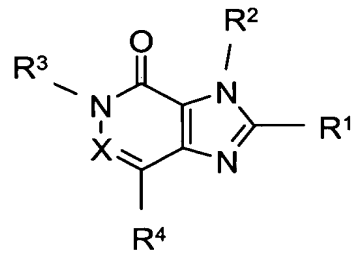
In the claims:

1. A compound comprised of general formula



(I)

wherein

X denotes a nitrogen atom or a group of formula C-R^5,

while R^5 denotes a hydrogen atom or a methyl group,

R^1 denotes a 5- to 7-membered cycloalkyleneimino group which is substituted by an amino group in the carbon skeleton and may be substituted by a C_{1-3}-alkyl group,

a 6- to 7-membered cycloalkyleneimino group wherein the methylene group is replaced by a –NH- group in the 4 position,

or an amino group substituted by a C_{5-7}-cycloalkyl group,

while the C_{5-7}-cycloalkyl group is substituted by an amino group or a carbon atom in the 3 position of the C_{5-7}-cycloalkyl group is replaced by an –NH- group,

R^2 denotes a benzyl group wherein the phenyl group may be substituted by one or two fluorine, chlorine or bromine atoms or by a cyano group,

a straight-chain or branched C_{3-8}-alkenyl group,

a C_{3-5}-alkynyl group,

a C_{3-7}-cycloalkylmethyl group,

a C_{5-7}-cycloalkenylmethyl group,

or a furylmethyl, thienylmethyl, pyrrolylmethyl, thiazolylmethyl, imidazolylmethyl, pyridinylmethyl, pyrimidinylmethyl, pyridazinylmethyl or pyrazinylmethyl group,

R^3 denotes a straight-chain or branched C_{1-6}-alkyl group,

a phenyl-C_{1-3}-alkyl or naphthyl-C_{1-3}-alkyl group optionally substituted in the aryl moiety by a halogen atom, a cyano, a C_{1-3}-alkyl or a methoxy group,

a 2-phenyl-2-hydroxy-ethyl group,

a phenylcarbonylmethyl group,

wherein the phenyl group may be substituted by a hydroxy, C_{1-3}-alkyloxy, amino-carbonyl-C_{1-3}-alkoxy, (C_{1-3}-alkylamino)-carbonyl-C_{1-3}-alkoxy, [di-(C_{1-3}-alkyl)-amino]-carbonyl-C_{1-3}-alkoxy, amino, C_{1-3}-alkyl-carbonylamino, C_{3-6}-cycloalkyl-carbonylamino, C_{1-3}-alkoxy-carbonylamino, C_{1-3}-alkylsulphonylamino or aminocarbonyl group,

a (3-methyl-2-oxo-2,3-dihydro-benzoxazolyl)-carbonylmethyl group,

a thienylcarbonylmethyl group,

a heteroaryl-C_{1-3}-alkyl group,

wherein said heteroaryl C_{1-3}-alkyl group is a monocyclic 5- or 6-membered heteroaryl group optionally substituted by one or two C_{1-3}-alkyl groups or by a morpholin-4-yl, pyridyl or phenyl group, while

said 6-membered heteroaryl group contains one, two or three nitrogen atoms and

said 5-membered heteroaryl group contains an imino group optionally substituted by a C_{1-3}-alkyl or phenyl-C_{1-3}-alkyl group, or an oxygen or sulphur atom or

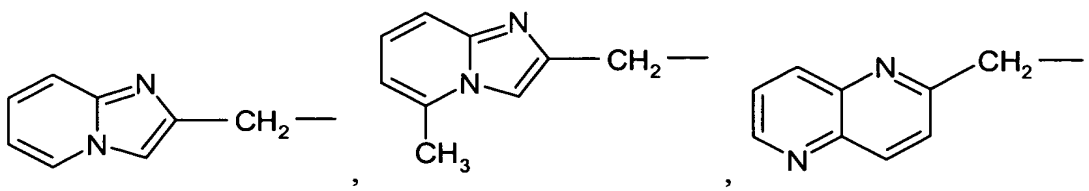
an imino group optionally substituted by a C_{1-3}-alkyl or phenyl-C_{1-3}-alkyl group or an oxygen or sulphur atom and additionally contains a nitrogen atom or

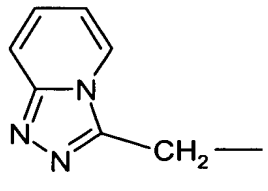
an imino group optionally substituted by a C_{1-3}-alkyl or phenyl-C_{1-3}-alkyl group or an oxygen or sulphur atom and additionally contains two or three nitrogen atoms,

and additionally a phenyl ring, which may optionally be substituted by a halogen atom, by one or two C_{1-3}-alkyl groups or by a trifluoromethyl or methoxy group, may be fused to the above-mentioned monocyclic heteroaryl groups via two adjacent carbon atoms

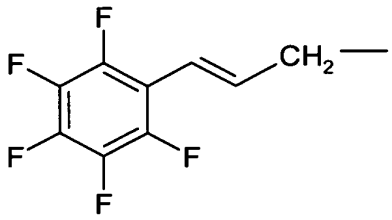
and the bond may be formed via an atom of the heterocyclic moiety or of the fused-on phenyl ring,

a bicyclic heteroarylmethyl group according to one of the formulae

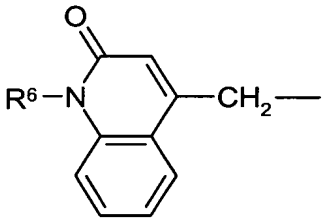
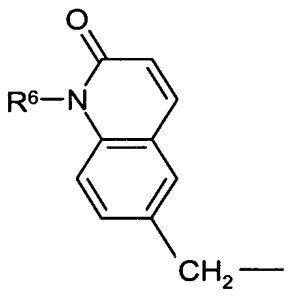
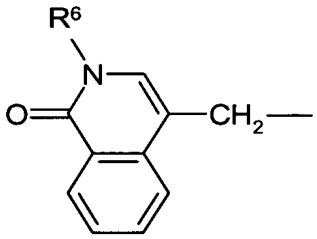


or  ,

a group of formula



or a group of formulae

 ,  or  ,

wherein R^6 in each case denotes a hydrogen atom or a methyl group,

and R^4 denotes a hydrogen atom or a C_{1-3}-alkyl group,

while unless otherwise stated the alkyl and alkoxy groups listed in the definitions which have more than two carbon atoms may be straight-chain or branched,

and the hydrogen atoms of the methyl or ethyl groups listed in the definitions may be wholly or partly replaced by fluorine atoms,

the tautomers, the enantiomers, the diastereomers, the mixtures thereof and the salts thereof.

2. Compounds of general formula I according to claim 1, wherein

X denotes a nitrogen atom or a methyne group,

R^1 denotes a piperazin-1-yl, 3-amino-piperidin-1-yl, 3-amino-3-methyl-piperidin-1-yl, 3-amino-pyrrolidin-1-yl, 1,4-diazepan-1-yl, (2-amino-cyclohexyl)-amino or piperidin-3-yl-amino group,

R^2 denotes a benzyl group wherein the phenyl group may be substituted by one or two fluorine atoms, by a chlorine or bromine atom or by a cyano group,

a straight-chain or branched C_{3-8}-alkenyl group,

a propyn-3-yl or but-2-yn-4-yl group,

a cyclopropylmethyl group,

a C_{5-7}-cycloalkenylmethyl group,

or a furylmethyl or thienylmethyl group,

R^3 denotes a straight-chain or branched C_{1-6}-alkyl group,

a phenyl-C_{1-2}-alkyl or naphthyl-C_{1-2}-alkyl group optionally substituted in the aryl moiety by a fluorine, chlorine or bromine atom or by a cyano, C_{1-3}-alkyl or methoxy group,

a 2-phenyl-2-hydroxy-ethyl group,

a phenylcarbonylmethyl group,

wherein the phenyl group may be substituted by a hydroxy, C_{1-3}-alkyloxy, amino-carbonyl-C_{1-3}-alkoxy, (C_{1-3}-alkylamino)-carbonyl-C_{1-3}-alkoxy, [di-(C_{1-3}-alkyl)-amino]-carbonyl-C_{1-3}-alkoxy, amino, C_{1-3}-alkyl-carbonylamino, C_{3-6}-cycloalkyl-carbonylamino, C_{1-3}-alkoxy-carbonylamino, C_{1-3}-alkylsulphonylamino or aminocarbonyl group,

a (3-methyl-2-oxo-2,3-dihydro-benzoxazolyl)-carbonylmethyl group,

a thienylcarbonylmethyl group,

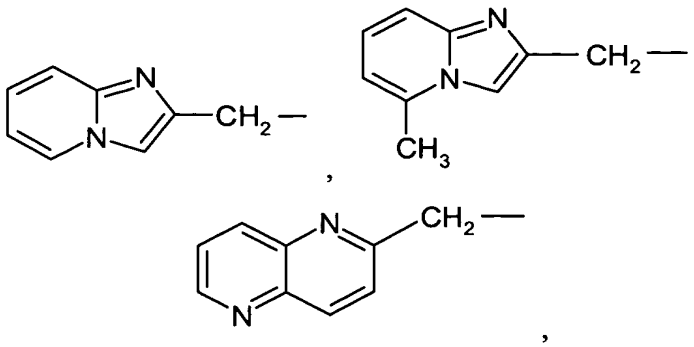
a heteroaryl-methyl group,

while by the phrase a "heteroaryl group" is meant a pyridinyl, pyrimidinyl, pyridazinyl, pyrazinyl, thiazolyl, oxazolyl, isothiazolyl, isoxazolyl, pyrazolyl, imidazolyl, oxadiazolyl, thiadiazolyl or thienyl group optionally substituted by one or two methyl groups or by a pyridyl or phenyl group,

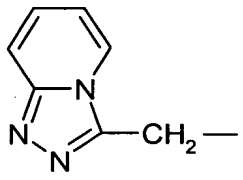
and while additionally a phenyl ring, which may optionally be substituted by a chlorine atom, by one or two methyl groups or by a trifluoromethyl or methoxy group, may be fused to the above-mentioned monocyclic heteroaryl groups via two adjacent carbon atoms

and the bond may be formed via an atom of the heterocyclic moiety or of the fused-on phenyl ring,

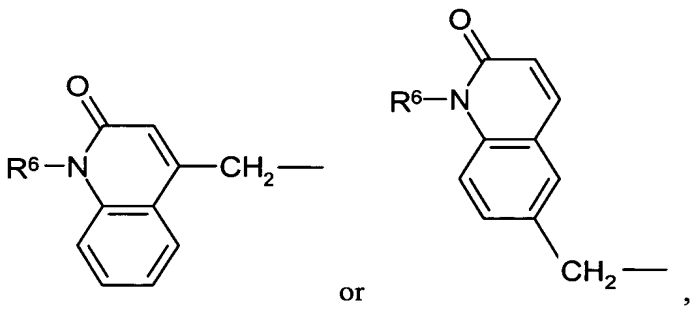
an imidazo[1,2-a]pyridin-2-yl-methyl group of formulae



a 1,2,4-triazolo[4,3-a]pyridin-3-yl group of formula



or a group of formulae



wherein R^6 in each case denotes a hydrogen atom or a methyl group,

and R^4 denotes a hydrogen atom or a methyl group,

while unless otherwise stated the alkyl and alkoxy groups listed in the definitions which have more than two carbon atoms may be straight-chain or branched,

and the hydrogen atoms of the methyl or ethyl groups listed in the definitions may be wholly or partly replaced by fluorine atoms,

the tautomers, the enantiomers, the diastereomers, the mixtures thereof and the salts thereof.

3. Compounds of general formula I according to claim 1, wherein

X, R^2, R^3 and R^4 are defined as in claim 2 and

R^1 denotes a 3-amino-piperidin-1-yl group,

the tautomers, the enantiomers, the diastereomers, the mixtures thereof and the salts thereof.

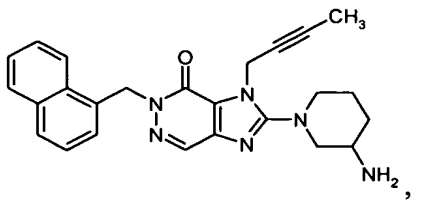
4. Compounds of general formula I according to claim 2 and

R^2 denotes a 3-methylallyl, a 3,3-dimethylallyl or a but-2-yn-4-yl group,

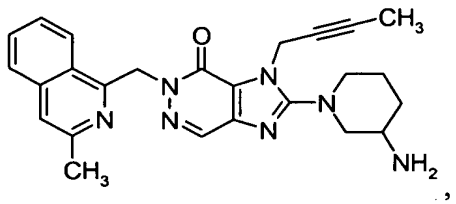
the tautomers, the enantiomers, the diastereomers, the mixtures thereof and the salts thereof.

5. A compound selected from the group consisting of:

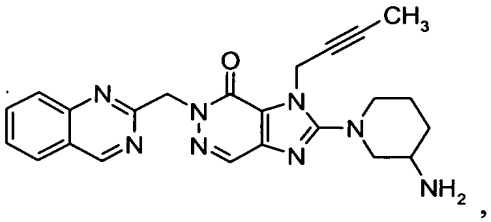
(1) 2-(3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(naphthalen-1-ylmethyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



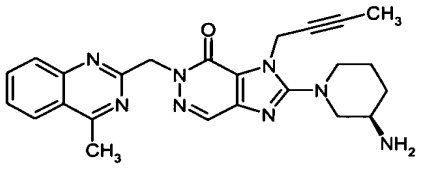
(2) 2-(3-amino-piperidin-1-yl)-3-but-2-ynyl-5-(3-methyl-isoquinolin-1-ylmethyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one,



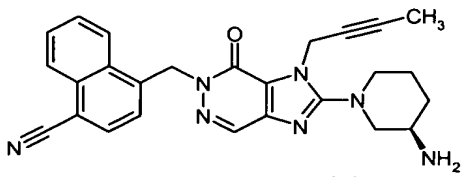
(3) 2-(3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(quinazolin-2-ylmethyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



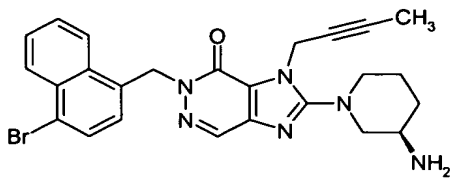
(4) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(4-methyl-quinazolin-2-yl-methyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



(5) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(4-cyano-naphthalen-1-yl-methyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



(6) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(4-bromonaphth-1-ylmethyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



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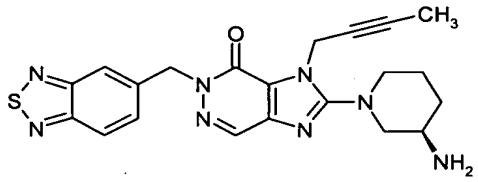
(7) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(benzo[1,2,5]thiadiazol-5-yl-methyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



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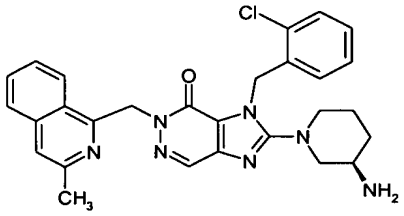
(8) 2-((*R*)-3-amino-piperidin-1-yl)-3-(2-chlorobenzyl)-5-(3-methyl-isoquinolin-1-ylmethyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



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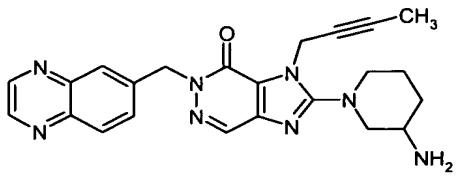
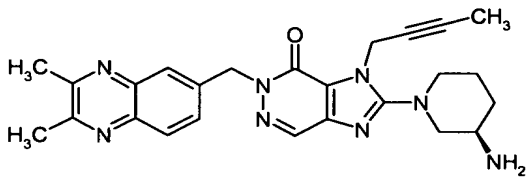
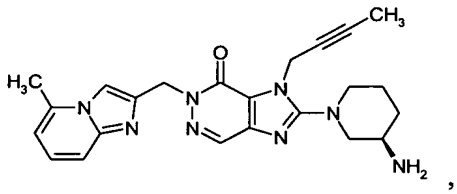
(9) 2-(3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(quinoxalin-6-ylmethyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



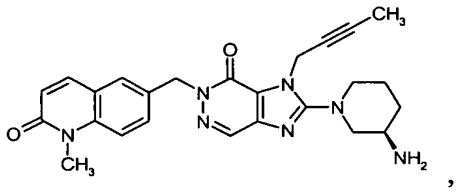
(10) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(2,3-dimethyl-quinoxalin-6-yl-methyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



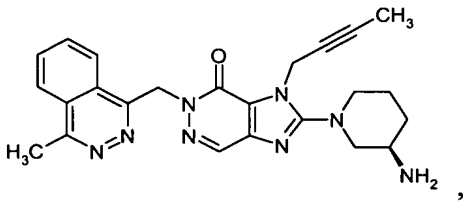
(11) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(5-methyl-imidazo[1,2-a]pyridin-2-ylmethyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



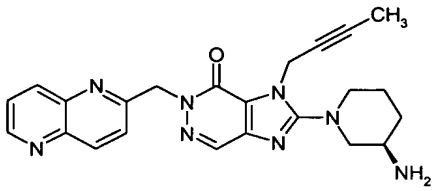
(12) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(1-methyl-1*H*-quinolin-2-on-6-ylmethyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



(13) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(4-methyl-phthalazin-1-yl-methyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one

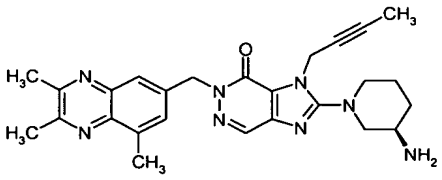


(14) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-([1,5]naphthyridin-2-ylmethyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



and

(15) 2-((*R*)-3-amino-piperidin-1-yl)-3-(but-2-ynyl)-5-(2,3,8-trimethyl-quinoxalin-6-yl-methyl)-3,5-dihydro-imidazo[4,5-d]pyridazin-4-one



and the enantiomers and the salts thereof.

6. Physiologically acceptable salts of the compounds according to claim 1 with inorganic or organic acids.

7. Pharmaceutical compositions containing a compound according to claim 6 optionally together with one or more inert carriers and/or diluents.

8. Pharmaceutical compositions containing a compound according to claim 1 optionally together with one or more inert carriers and/or diluents.

9. A method of treating a disease selected from the list consisting of type I and type II diabetes mellitus, arthritis, obesity, allograft transplantation and osteoporosis caused by calcitonin, in a mammal in need thereof, by administration of a pharmaceutically acceptable amount of a compound according to claim 1.